

Consulting
Engineers and
Scientists

March 20, 2017

Omar Sierra-Lopez
Office of Water Protection
Underground Injection Control Unit
1595 Wynkoop St.
Denver, CO 80202-1129

Re: Submittal of Application for UIC Class V Dewatering Injection Well

GEI Consultants, Inc. (GEI) is submitting this request to apply for authorization for use of Class V Dewatering Injection Wells on behalf of Confluence Apartments/PM Realty Group.

Confluence Apartments is located at 1441 Little Raven St., Denver, CO 80202 at the confluence of Cherry Creek and the South Platte River. The “wastewater” from this facility consists of groundwater that infiltrates through the alluvial soils and pervious seams in the upper portion of the Denver Formation bedrock into a drainage system below the lowest basement level. The facility is currently collecting the groundwater in a sump, then discharging this water to the storm drain at Little Raven under General Permit COG 315339. The discharge water has been treated using a temporary treatment system. Treatment was necessary due to no dilution allowances when discharging under the general permit. Construction of the building is nearing completion, and it is necessary for PM Realty Group to remove the temporary treatment and discharge system and obtain a permanent dewatering option to prepare the building for occupancy. An application for a new individual discharge permit was submitted to Colorado Department of Public Health and Environment (CDPHE) on May 3, 2016. While we have been in communication with CDPHE’s permitting department, there have been continual delays and the draft permit was not issued until February 2017, however, the permit has not yet been finalized. At this time we are pursuing alternative options for disposal of this infiltrated groundwater.

1. Applicant Name:
PM Realty Group
2828 Routh Street, Suite 700
Dallas, TX 75201
Contact – Bryant Nail, Executive Vice President
972-421-3378, bnail@pmrg.com
2. Reason for Application: As noted above, groundwater infiltrates through the Denver Formation bedrock into a drainage system below the lowest basement level at the apartment building. This system requires continuous dewatering. We are

proposing to reinject this water back into the alluvial aquifer system above the bedrock at the building site.

3. Location of Proposed Well:
Confluence Apartments
1441 Little Raven St.
Denver, CO 80202
Contact – Bryant Nail 972-421-3378, bnail@pmrg.com
Latitude: 39.7541 Longitude: -105.0075
4. Area Geology and Hydrology: In the downtown Denver area, the geologic cross section generally consists of a few feet of artificial fill, underlain by alluvial sands, gravels and cobbles. At the Confluence Apartments site, the fill and alluvial overburden zone is about 42 feet in total thickness. The alluvial materials are generally finer grained near the ground surface, but become coarser in depth with greater percentages of gravel and cobbles near the base. Aquifer tests conducted in the alluvial soils indicate that the hydraulic conductivity typically ranges from about 1×10^{-3} to 1×10^{-1} cm/sec. The alluvial soils are underlain by the Denver Formation, which consist of dark to light gray claystone, siltstone, sandstone, and shale. This formation ranges in thickness from 600 to 1600 feet, and serves as an aquiclude to the overlying alluvial aquifer system. In the site area, the perched groundwater system lies near the elevation of Cherry Creek, about 15 to 20 feet below general site grades. The near surface aquifer system is not used as a drinking water source in the Denver Metropolitan area. There are numerous existing registered wells within one mile of the Confluence Apartments site. Our review of the installation records indicate that these are all monitoring wells installed to depths of 50 feet or less.
5. Groundwater Sampling and Analysis: The results of the groundwater influent analyzed in 2016 are attached (Attachment A).
6. Injection Well Design, Proposed Use, and Duration of Operation: The injection system will consist of 2 dry wells each 4 feet in diameter installed in vertical shafts on the Little Raven side of the project site to depths of about 14 to 15 feet below current grades. This is slightly above the typical seasonal high groundwater system in the site area. Water will be introduced into the wells from a pipe about 3 feet from the top of the well and will be allowed to pool in the base of the wells. The lower 3 feet of each well will include perforations to allow the collected water to seep into the alluvial soils and rejoin the perched groundwater system (Attachment B). The system will be fitted with valves to allow flows to be cut off from each well (one at a time) to allow for periodic maintenance. During the maintenance operation, all flows will be directed to a single well. The injection system will be operated for an indefinite period of time.
7. Injection Zone: As noted above the injection zone will consist of course alluvial sands, gravels and cobbles. It is estimated that this formation will be capable of

accepting all anticipated flows with only a small rise in the local groundwater elevation.

8. Site Dewatering Process: The system consists of a subfloor drainage system connected to a sump beneath all interior slabs on grade. The drainage system includes a pervious zone of sand fill beneath the entire floor slab, filtered collection pipes and a sump at the lowest point in the building. (Attachment C)
9. Investigation of Drinking Water Supply Wells in the Area: The Colorado Department of Natural Resources, Colorado Division of Water Resources site was utilized to search for any domestic drinking water wells in the vicinity of the site. No active domestic wells were observed within a 1 mile radius of the site. There was a permit issued for a domestic well in 1967 that is approximately 0.75 miles from the site, however, the location of this well is now in the Pepsi Center parking lot, and there are no residences adjacent to this area so it can be assumed this well is no longer in use.
10. Investigation of Potential Groundwater Contamination in the Area: The Colorado Department of Labor and Employment, Division of Oil and Public Safety site was utilized to search for any potential petroleum releases (events) in the vicinity of the site. There are no “open events” indicating petroleum releases within a 2 mile vicinity of the site. There are “closed events” within 1 mile of the site, on the same side of the South Platte River, however, none of these events were recent, with the most recent having been cleaned up 12 years ago.
11. Injection Well Closure Plan: At the present time, it is anticipated that the injection well system will operate indefinitely. Closure, if required, will consist of disconnecting influent water lines and filling the wells with gravel or other coarse materials.
12. Responsible Party:
PM Realty Group
2828 Routh Street, Suite 700
Dallas, TX 75201
Contact – Bryant Nail, Executive Vice President
972-421-3378, bnail@pmrg.com
13. Responsible Party for Well Operation and Closure:

PM Realty Group
2828 Routh Street, Suite 700
Dallas, TX 75201
Contact – Bryant Nail, Executive Vice President
972-421-3378, bnail@pmrg.com
14. State Oversight Contact: n/a

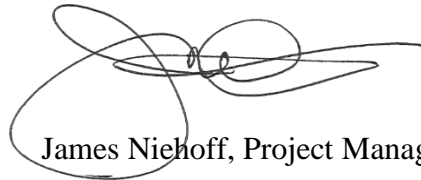
Thank you for your consideration of this application. Please let us know if you have additional questions or concerns and we would be happy to discuss them with you.

Sincerely,

GEI CONSULTANTS, INC.



Suzanne Pargee, Water Quality Specialist



James Niehoff, Project Manager

Parameter	Units	PQLs	Date				
			1/22/2016	3/15/2016	4/27/2016	7/1/2016	10/1/2016
DO	(mg/l)			7.8			
pH	(su)			7.57			
Nitrate as N	(mg/l)	0.1		<0.8			
Nitrite	(mg/l)	0.05		ND			
TIN	(mg/l)	0.2		0.08			
NH ₃ as N, Tot	(mg/l)	0.2		0.08			
TSS	(mg/l)	5	7				
Oil and Grease	(mg/l)			11			
TDS- PWS intake	(dS/m)	10		713			
Al, TR	(µg/l)	15			23	18	26
As, TR	(µg/l)	1	15.62		ND	0.9	1.2
As, PD	(µg/l)					0.9	1.1
As, Dis	(µg/l)	1			ND		
Ba, TR	(µg/l)	1			100.3	90.4	74.6
Be, TR	(µg/l)	2			ND	0.2	ND
Cd, TR	(µg/l)	0.5			0.1	0.1	ND
Cd, PD	(µg/l)					0.1	ND
Cd, Dis	(µg/l)	0.5	ND		ND		
Cr, TR	(µg/l)	5			ND		
Cr, Dis	(µg/l)	5			<10		
Cr+3, TR	(µg/l)	20			ND		ND
Cr+3, PD	(µg/l)					ND	ND
Cr+6, Dis	(µg/l)	20			ND	ND	ND
Cu, TR	(µg/l)	2			2.1	1.3	ND
Cu, PD	(µg/l)					1.3	ND
Cu, Dis	(µg/l)	2			2		
Fe, Dis	(µg/l)	22.5	<50		11	7	14
Fe, TR	(µg/l)	22.5	54		413	379	140
Pb, TR	(µg/l)	0.5			0.1	ND	ND
Pb, PD	(µg/l)					ND	ND
Pb, Dis	(µg/l)	0.5	<1		0.1		
Mn, TR	(µg/l)	2			998.2		
Mn, Dis	(µg/l)	2	2.87		989.5	965	813.1
Mo, TR	(µg/l)	0.5			4	4.1	6.5
Hg, Tot	(µg/l)	0.1/0.003 (high/low-level)					
Ni, TR	(µg/l)	1			3.3	2.8	1.9
Ni, PD	(µg/l)					2.8	1.7
Ni, Dis	(µg/l)	1			3.3		
Se, TR	(µg/l)	1			1.4	0.8	ND
Se, PD	(µg/l)					ND	ND
Se, Dis	(µg/l)	1	10.9		1.3		
Ag, TR	(µg/l)	0.5			ND	ND	ND
Ag, PD	(µg/l)					ND	ND
Ag, Dis	(µg/l)	0.5			ND		
U, TR	(µg/l)	1				10.4	4.9
U, PD	(µg/l)					9.9	4.5

Parameter	Units	PQLs	Date				
			1/22/2016	3/15/2016	4/27/2016	7/1/2016	10/1/2016
Zn, TR	(µg/l)	10			5	8	1
Zn, PD	(µg/l)					4	1
Zn, Dis	(µg/l)	10			4		
B, Tot	(mg/l)	20		0.176			
Chloride	(mg/l)	2		139			
Fluoride	(mg/l)	0.5		0.936			
Sulfate	(mg/l)	2		140			
Sulfide as H ₂ S	(mg/l)	0.1		<0.5			
Calcium	(mg/l)	0.12		109			
Magnesium	(mg/l)	0.035		15.8			
Bicarbonate	(mg/l)			190			
Hardness as CaCO ₃	(mg/l)			337			
Sb, TR	(µg/l)	2			ND	1.2	ND
TI, TR	(µg/l)	0.5			ND	0.2	ND
TI, P Dis	(µg/l)	0.5			ND	ND	ND
P, Tot	(mg/l)	0.05		ND			
Alkalinity, Total	mg/L	5		191			
WAD cyanide	(µg/l)	10		ND			
TCE	(µg/l)	1	4.94				

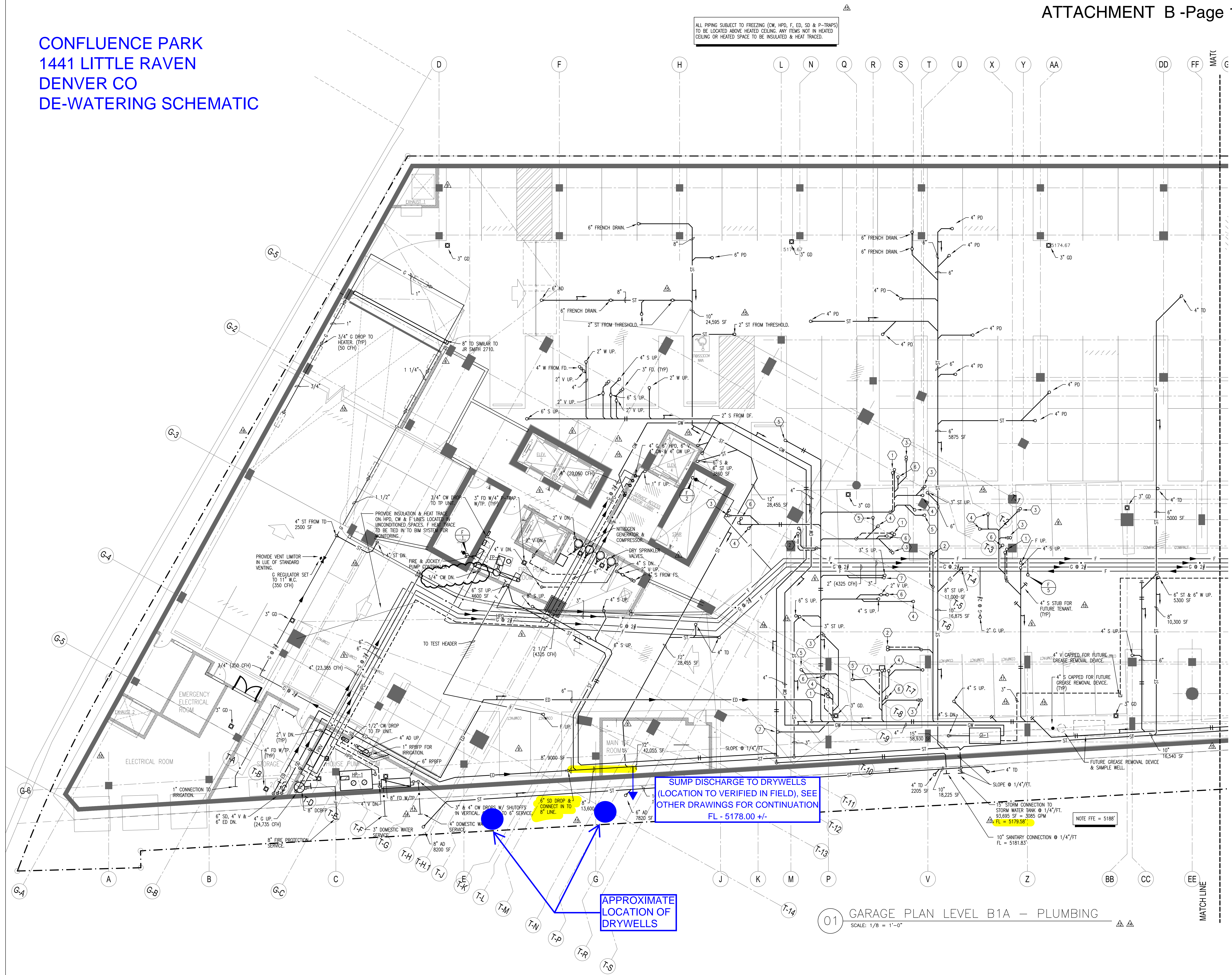
Category	Sampled	Parameter	Result	Units	Limit	Method
Volatile	01/22/16	Benzene	ND	ug/l	1.00	EPA 8260B
Volatile	01/22/16	Naphthalene	ND	ug/l	1.00	EPA 8260B
Volatile	01/22/16	Tetrachloroethene	4.94	ug/l	1.00	EPA 8260B
Volatile	01/22/16	Trichloroethene	2.72	ug/l	1.00	EPA 8260B

Category	Sampled	Parameter	Result	Units	Limit	Method
Semivolatile	03/15/16	4-Chloro-3-methylphenol	ND	ug/l	10.0	EPA 8270D
Semivolatile	03/15/16	2-Chlorophenol	ND	ug/l	10.0	EPA 8270D
Semivolatile	03/15/16	2,4-Dinitrophenol	ND	ug/l	10.0	EPA 8270D
Semivolatile	03/15/16	2,4-Dichlorophenol	ND	ug/l	10.0	EPA 8270D
Semivolatile	03/15/16	2,4-Dimethylphenol	ND	ug/l	10.0	EPA 8270D
Semivolatile	03/15/16	4,6-Dinitro-2-methylphenol	ND	ug/l	10.0	EPA 8270D
Semivolatile	03/15/16	2-Methylphenol	ND	ug/l	10.0	EPA 8270D
Semivolatile	03/15/16	4-Methylphenol	ND	ug/l	10.0	EPA 8270D
Semivolatile	03/15/16	2-Nitrophenol	ND	ug/l	10.0	EPA 8270D
Semivolatile	03/15/16	4-Nitrophenol	ND	ug/l	10.0	EPA 8270D
Semivolatile	03/15/16	2,3,4,6-Tetrachlorophenol	ND	ug/l	10.0	EPA 8270D
Semivolatile	03/15/16	Pentachlorophenol	ND	ug/l	10.0	EPA 8270D
Semivolatile	03/15/16	Phenol	ND	ug/l	10.0	EPA 8270D
Semivolatile	03/15/16	2,4,5-Trichlorophenol	ND	ug/l	10.0	EPA 8270D
Semivolatile	03/15/16	2,4,6-Trichlorophenol	ND	ug/l	10.0	EPA 8270D

Category	Sampled	Parameter	Result	Units	Limit	Method
VOCs	4/27/16	1,1,1,2-Tetrachloroethane	ND	ug/L	1	E624
VOCs	4/27/16	1,1,1-Trichloroethane	ND	ug/L	1	E624
VOCs	4/27/16	1,1,2,2-Tetrachloroethane	ND	ug/L	1	E624
VOCs	4/27/16	1,1,2-Trichloroethane	ND	ug/L	1	E624
VOCs	4/27/16	1,1-Dichloroethane	ND	ug/L	1	E624
VOCs	4/27/16	1,1-Dichloroethene	ND	ug/L	1	E624
VOCs	4/27/16	1,1-Dichloropropene	ND	ug/L	1	E624
VOCs	4/27/16	1,2,3-Trichloropropane	ND	ug/L	1	E624
VOCs	4/27/16	1,2-Dibromoethane	ND	ug/L	1	E624
VOCs	4/27/16	1,2-Dichlorobenzene	ND	ug/L	1	E624
VOCs	4/27/16	1,2-Dichloroethane	ND	ug/L	1	E624
VOCs	4/27/16	1,2-Dichloropropane	ND	ug/L	1	E624
VOCs	4/27/16	1,3-Dichlorobenzene	ND	ug/L	1	E624
VOCs	4/27/16	1,3-Dichloropropane	ND	ug/L	1	E624
VOCs	4/27/16	1,4-Dichlorobenzene	ND	ug/L	1	E624
VOCs	4/27/16	2,2-Dichloropropane	ND	ug/L	1	E624
VOCs	4/27/16	2-Chloroethyl vinyl ether	ND	ug/L	1	E624
VOCs	4/27/16	2-Chlorotoluene	ND	ug/L	1	E624
VOCs	4/27/16	4-Chlorotoluene	ND	ug/L	1	E624
VOCs	4/27/16	Acetone	ND	ug/L	20	E624
VOCs	4/27/16	Acetonitrile	ND	ug/L	20	E624
VOCs	4/27/16	Acrolein	ND	ug/L	20	E624
VOCs	4/27/16	Acrylonitrile	ND	ug/L	20	E624
VOCs	4/27/16	Benzene	12.7	ug/L	1	E624
VOCs	4/27/16	Bromobenzene	ND	ug/L	1	E624
VOCs	4/27/16	Bromochloromethane	ND	ug/L	1	E624
VOCs	4/27/16	Bromodichloromethane	ND	ug/L	1	E624
VOCs	4/27/16	Bromoform	ND	ug/L	1	E624
VOCs	4/27/16	Bromomethane	ND	ug/L	1	E624
VOCs	4/27/16	Carbon disulfide	ND	ug/L	1	E624
VOCs	4/27/16	Carbon tetrachloride	ND	ug/L	1	E624
VOCs	4/27/16	Chlorobenzene	ND	ug/L	1	E624
VOCs	4/27/16	Chlorodibromomethane	ND	ug/L	1	E624
VOCs	4/27/16	Chloroethane	ND	ug/L	1	E624
VOCs	4/27/16	Chloroform	ND	ug/L	1	E624
VOCs	4/27/16	Chloromethane	ND	ug/L	1	E624
VOCs	4/27/16	cis-1,2-Dichloroethene	ND	ug/L	1	E624
VOCs	4/27/16	cis-1,3-Dichloropropene	ND	ug/L	1	E624
VOCs	4/27/16	Dibromomethane	ND	ug/L	1	E624
VOCs	4/27/16	Dichlorodifluoromethane	ND	ug/L	1	E624
VOCs	4/27/16	Ethylbenzene	9.12	ug/L	1	E624
VOCs	4/27/16	m+p-Xylenes	8.24	ug/L	1	E624
VOCs	4/27/16	Methyl ethyl ketone	ND	ug/L	20	E624
VOCs	4/27/16	Methyl isobutyl ketone	ND	ug/L	20	E624
VOCs	4/27/16	Methyl tert-butyl ether (MTBE)	ND	ug/L	2	E624
VOCs	4/27/16	Methylene chloride	ND	ug/L	1	E624
VOCs	4/27/16	Naphthalene	88	ug/L	1	E624
VOCs	4/27/16	o-Xylene	8.48	ug/L	1	E624
VOCs	4/27/16	Styrene	2.38	ug/L	1	E624
VOCs	4/27/16	Tetrachloroethene	ND	ug/L	1	E624
VOCs	4/27/16	Toluene	10.4	ug/L	1	E624

VOCs	4/27/16	trans-1,2-Dichloroethene	ND	ug/L	1	E624
VOCs	4/27/16	trans-1,3-Dichloropropene	ND	ug/L	1	E624
VOCs	4/27/16	Trichloroethene	ND	ug/L	1	E624
VOCs	4/27/16	Trichlorofluoromethane	ND	ug/L	1	E624
VOCs	4/27/16	Vinyl acetate	ND	ug/L	1	E624
VOCs	4/27/16	Vinyl chloride	ND	ug/L	1	E624
VOCs	4/27/16	Xylenes, Total	16.7	ug/L	1	E624
SVOCs	4/27/16	1,2,4-Trichlorobenzene	ND	ug/L	10	E625
SVOCs	4/27/16	1,2-Dichlorobenzene	ND	ug/L	10	E625
SVOCs	4/27/16	1,3-Dichlorobenzene	ND	ug/L	10	E625
SVOCs	4/27/16	1,4-Dichlorobenzene	ND	ug/L	10	E625
SVOCs	4/27/16	2,4,6-Trichlorophenol	ND	ug/L	10	E625
SVOCs	4/27/16	2,4-Dichlorophenol	ND	ug/L	10	E625
SVOCs	4/27/16	2,4-Dimethylphenol	ND	ug/L	10	E625
SVOCs	4/27/16	2,4-Dinitrophenol	ND	ug/L	50	E625
SVOCs	4/27/16	2,4-Dinitrotoluene	ND	ug/L	10	E625
SVOCs	4/27/16	2,6-Dinitrotoluene	ND	ug/L	10	E625
SVOCs	4/27/16	2-Chloronaphthalene	ND	ug/L	10	E625
SVOCs	4/27/16	2-Chlorophenol	ND	ug/L	10	E625
SVOCs	4/27/16	2-Nitrophenol	ND	ug/L	10	E625
SVOCs	4/27/16	3,3'-Dichlorobenzidine	ND	ug/L	10	E625
SVOCs	4/27/16	4,6-Dinitro-2-methylphenol	ND	ug/L	50	E625
SVOCs	4/27/16	4-Bromophenyl phenyl ether	ND	ug/L	10	E625
SVOCs	4/27/16	4-Chloro-3-methylphenol	ND	ug/L	10	E625
SVOCs	4/27/16	4-Chlorophenyl phenyl ether	ND	ug/L	10	E625
SVOCs	4/27/16	4-Nitrophenol	ND	ug/L	50	E625
SVOCs	4/27/16	Acenaphthene	ND	ug/L	10	E625
SVOCs	4/27/16	Acenaphthylene	ND	ug/L	10	E625
SVOCs	4/27/16	Anthracene	ND	ug/L	10	E625
SVOCs	4/27/16	Azobenzene	ND	ug/L	10	E625
SVOCs	4/27/16	Benzidine	ND	ug/L	10	E625
SVOCs	4/27/16	Benzo(a)anthracene	ND	ug/L	10	E625
SVOCs	4/27/16	Benzo(a)pyrene	ND	ug/L	10	E625
SVOCs	4/27/16	Benzo(b)fluoranthene	ND	ug/L	10	E625
SVOCs	4/27/16	Benzo(g,h,i)perylene	ND	ug/L	10	E625
SVOCs	4/27/16	Benzo(k)fluoranthene	ND	ug/L	10	E625
SVOCs	4/27/16	bis(-2-chloroethoxy)Methane	ND	ug/L	10	E625
SVOCs	4/27/16	bis(-2-chloroethyl)Ether	ND	ug/L	10	E625
SVOCs	4/27/16	bis(2-chloroisopropyl)Ether	ND	ug/L	10	E625
SVOCs	4/27/16	bis(2-ethylhexyl)Phthalate	ND	ug/L	10	E625
SVOCs	4/27/16	Butylbenzylphthalate	ND	ug/L	10	E625
SVOCs	4/27/16	Chrysene	ND	ug/L	10	E625
SVOCs	4/27/16	Dibenzo(a,h)anthracene	ND	ug/L	10	E625
SVOCs	4/27/16	Diethyl phthalate	ND	ug/L	10	E625
SVOCs	4/27/16	Dimethyl phthalate	ND	ug/L	10	E625
SVOCs	4/27/16	Di-n-butyl phthalate	ND	ug/L	10	E625
SVOCs	4/27/16	Di-n-octyl phthalate	ND	ug/L	10	E625
SVOCs	4/27/16	Fluoranthene	ND	ug/L	10	E625
SVOCs	4/27/16	Fluorene	ND	ug/L	10	E625
SVOCs	4/27/16	Hexachlorobenzene	ND	ug/L	10	E625
SVOCs	4/27/16	Hexachlorobutadiene	ND	ug/L	10	E625
SVOCs	4/27/16	Hexachlorocyclopentadiene	ND	ug/L	10	E625

SVOCs	4/27/16	Hexachloroethane	ND	ug/L	10	E625
SVOCs	4/27/16	Indeno(1,2,3-cd)pyrene	ND	ug/L	10	E625
SVOCs	4/27/16	Isophorone	ND	ug/L	10	E625
SVOCs	4/27/16	Naphthalene	ND	ug/L	10	E625
SVOCs	4/27/16	Nitrobenzene	ND	ug/L	10	E625
SVOCs	4/27/16	n-Nitrosodimethylamine	ND	ug/L	10	E625
SVOCs	4/27/16	n-Nitroso-di-n-propylamine	ND	ug/L	10	E625
SVOCs	4/27/16	n-Nitrosodiphenylamine	ND	ug/L	10	E625
SVOCs	4/27/16	Pentachlorophenol	ND	ug/L	50	E625
SVOCs	4/27/16	Phenanthrene	ND	ug/L	10	E625
SVOCs	4/27/16	Phenol	ND	ug/L	10	E625
SVOCs	4/27/16	Pyrene	ND	ug/L	10	E625
VOCs	4/27/16	Benzene	1.3	ug/L	1	SW8260B
VOCs	4/27/16	Naphthalene	6.8	ug/L	1	SW8260B
VOCs	4/27/16	Tetrachloroethene	ND	ug/L	1	SW8260B
VOCs	4/27/16	Trichloroethene	ND	ug/L	1	SW8260B



Rim=5186.6

LID

INFILTRATION SHAFTING

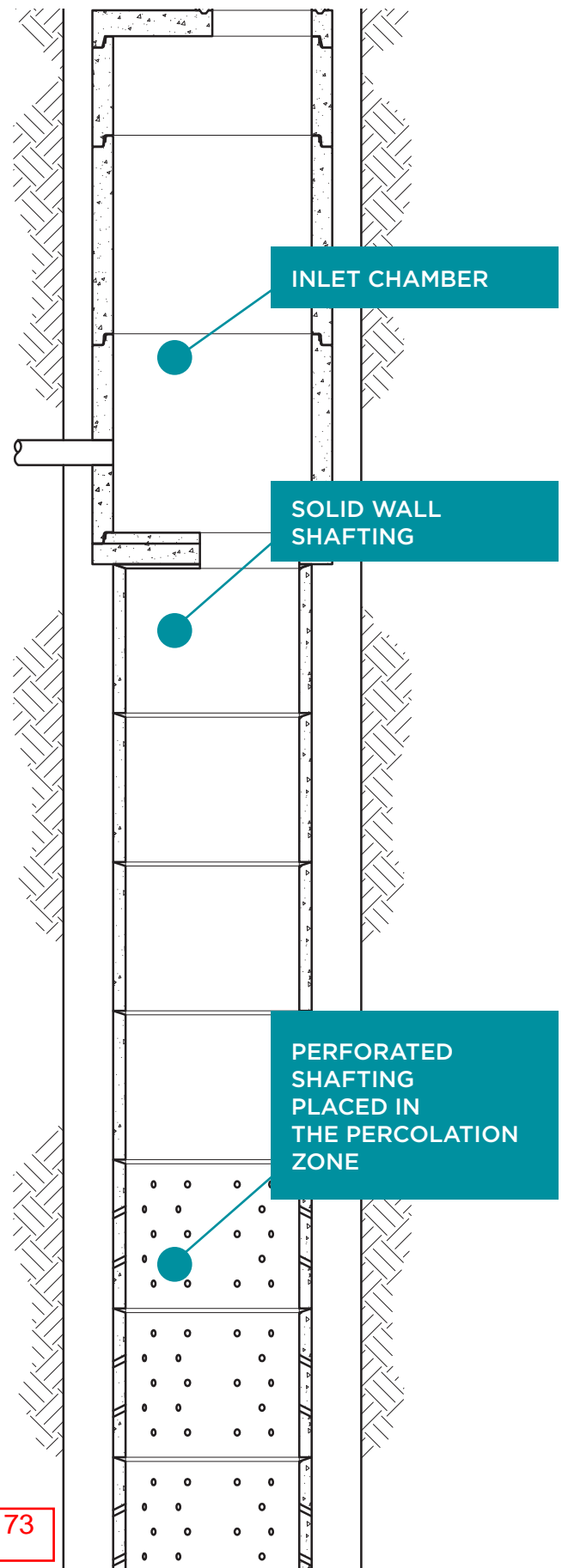
INV
IN=5178.0

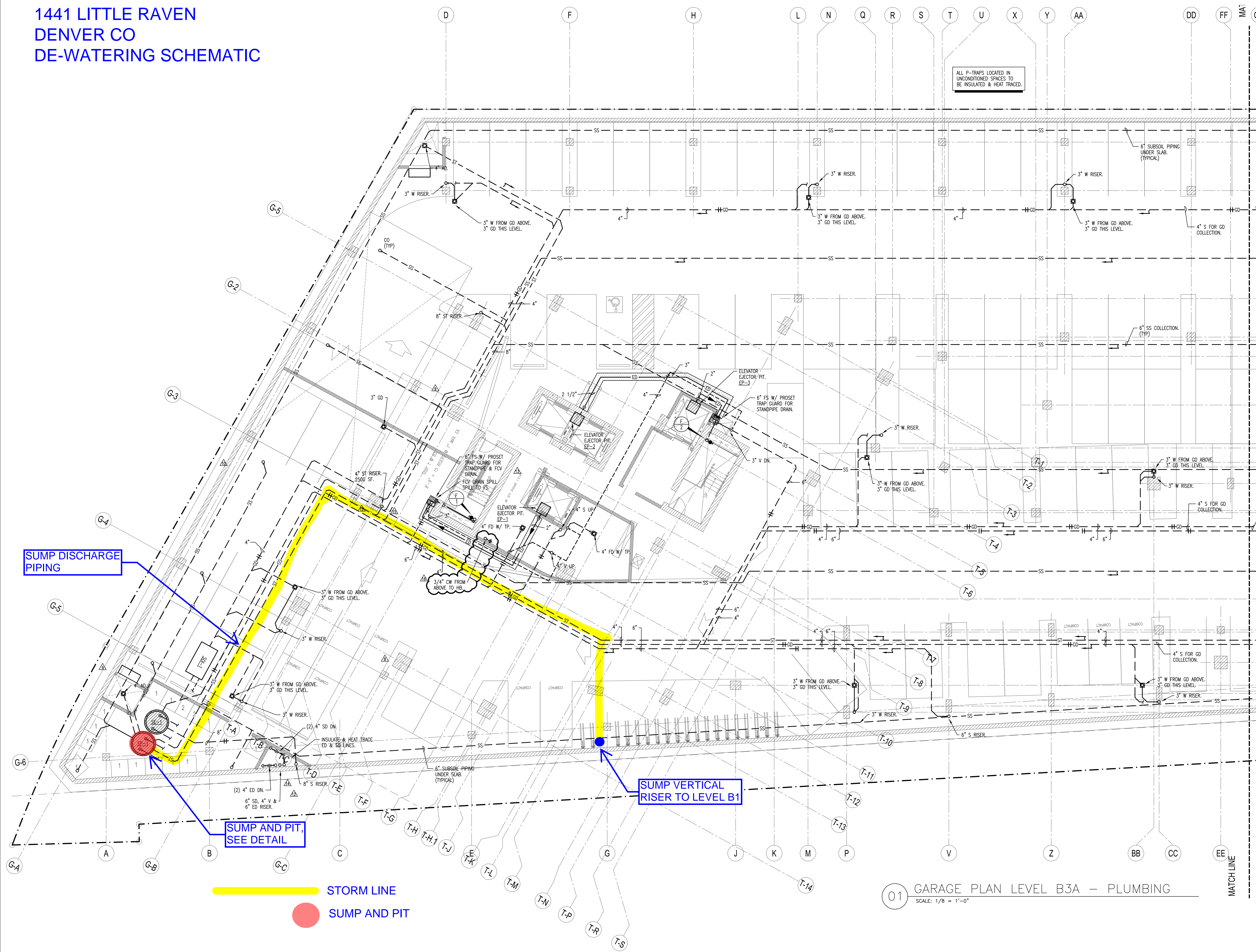
In high-density areas, matching pre-development conditions is often difficult to achieve. The proximity of infrastructure, buildings, and property lines preclude using large above or underground spaces to install storage and infiltration units.

Jensen Stormwater's Precast LID Infiltration Shafting enables infiltration in extremely limited space by achieving large infiltration volumes in a small footprint. A properly designed infiltration system combined with in-situ soils having high infiltration rates may completely eliminate any stormwater discharge from a given development.

In addition to minimizing the impact to the stormwater system, LID Infiltration Shafting emulates pre-development conditions where water has a chance to recharge ground-water.

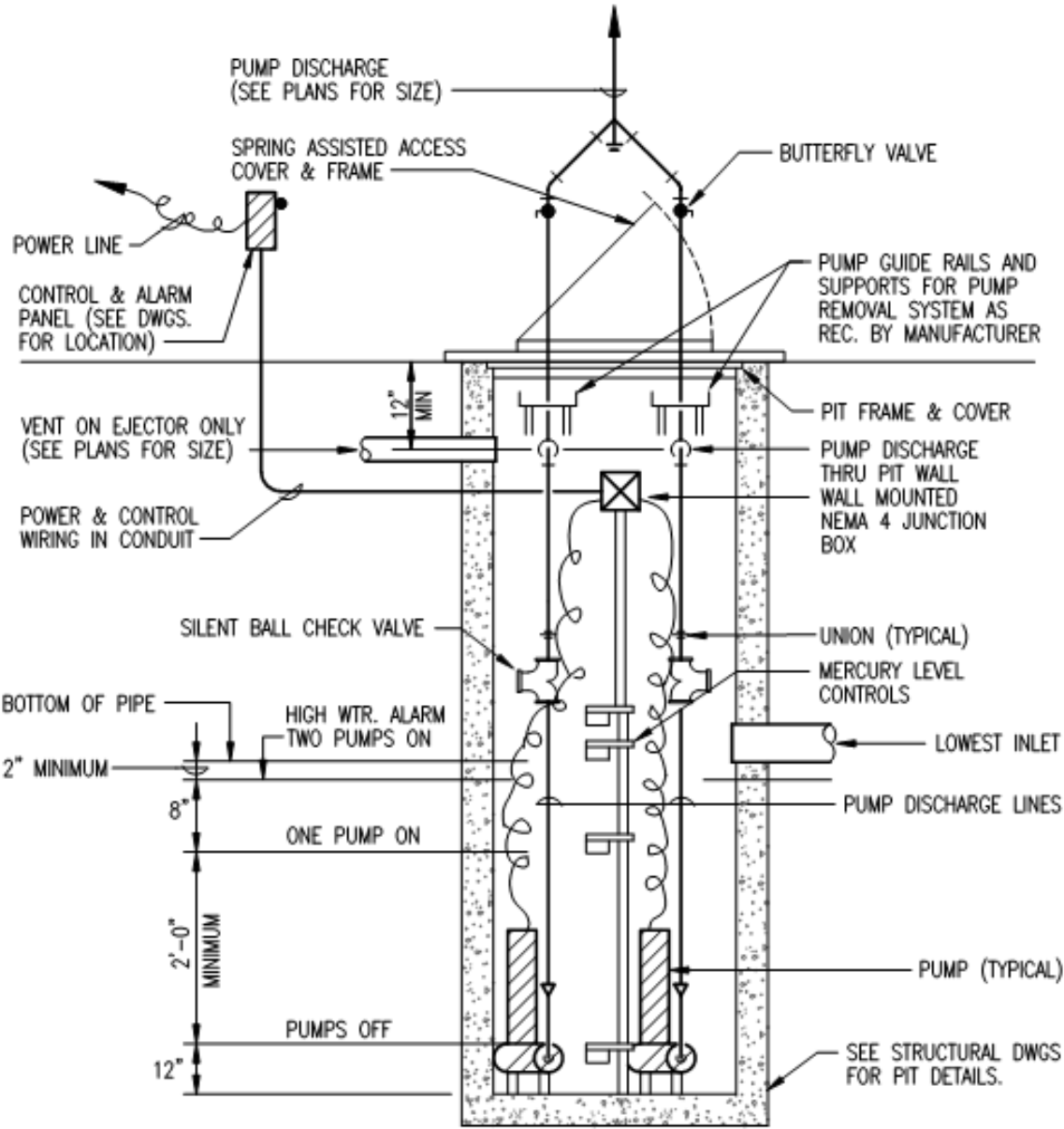
Bottom=5173





CONFLUENCE PARK
1441 LITTLE RAVEN
DENVER CO
DE-WATERING SCHEMATIC

SUMP PUMP SCHEDULE	
Designation	SP-1
Location	B3
Type	Duplex
Speed (RPM)	1750
Impeller Size (inches)	8.38
Volt/Phase	460/3
Horse Power	7.5 Each
Flowrate (GPM)	200 Each
Head (FT)	60
Based On	Hydromatic S4M
Internal Pit Dimensions (ø x H)	5'-0" x 12'-0"
Comments	Rail Mounted



3 DUPLEX SUBMERSIBLE SUMP & EJECTOR UNIT
NO SCALE